

CLAIMS

What is claimed is:

1. A crane return system for returning a crane component to a home position when there is a loss of power, a crane including a bridge adapted to travel along at least one rail and including a plurality of main wheels to travel along the rail, the crane return system comprising:
 - a plurality of auxiliary drive wheels supported by the bridge, the auxiliary drive wheels movable between a first position, in which the auxiliary drive wheels are recessed from the rail, and a second position, in which the auxiliary drive wheels are in contact with the rail, wherein when power is supplied to the crane return system the auxiliary drive wheels are in the first position;
 - a hydraulic fluid pressure vessel for storing hydraulic fluid, wherein a substantially fixed mass of hydraulic fluid is contained within the crane return system;
 - a hydraulic cylinder interconnected with the auxiliary drive wheels and selectively fluidly communicating with the hydraulic fluid pressure vessel, wherein when power is lost to the crane, hydraulic fluid is supplied to the hydraulic cylinder to extend the hydraulic cylinder and thereby move the auxiliary drive wheels from the first position to the second position; and
 - a drive motor interconnected with the auxiliary drive wheels and selectively fluidly communicating with the hydraulic fluid pressure vessel, wherein when the auxiliary drive wheels are in the second position, hydraulic fluid is diverted from the hydraulic cylinder and supplied to the drive motor to rotate the auxiliary drive wheels and move the bridge toward a home position.
2. The crane return system of claim 1, and further comprising a normally-closed power loss valve in fluid communication with the hydraulic fluid pressure vessel and interconnected with a power source, wherein when power is lost to the crane return system the power loss valve opens to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the hydraulic cylinder.
3. The crane return system of claim 1, and further comprising a wheel down valve in fluid communication with the hydraulic fluid pressure vessel, wherein when the auxiliary drives wheels make contact with the rail the wheel down valve is actuated to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the drive motor.

4. The crane return system of claim 3, and further comprising a wheel down limit switch coupled to the wheel down valve, wherein upon contact of the wheel down limit switch with the at least one rail, the wheel down limit switch actuates the wheel down valve to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the drive motor.
5. The crane return system of claim 1, and further comprising a normally-open home position valve in fluid communication with the drive motor, wherein when the bridge reaches the home position the home position valve closes to stop flow of hydraulic fluid to the drive motor and thereby stop rotation of the auxiliary drive wheels.
6. The crane return system of claim 5, and further comprising a home position limit switch coupled to the home position valve, wherein upon contact of the home position limit switch with the home position, the home position limit switch actuates the home position valve closed.
7. The crane return system of claim 1, and further comprising a normally-closed reset valve in fluid communication with the hydraulic cylinder, wherein when power is restored to the crane after loss of power the reset valve opens to allow hydraulic fluid to flow to and from the hydraulic cylinder to retract the hydraulic cylinder and thereby move the auxiliary drive wheels from the second position to the first position.
8. The crane return system of claim 1, and further comprising a hydraulic fluid reservoir in fluid communication with the hydraulic cylinder, the drive motor and the hydraulic fluid pressure vessel, the hydraulic fluid reservoir for receiving hydraulic fluid from the hydraulic cylinder and the drive motor and for delivering hydraulic fluid to the hydraulic fluid pressure vessel.
9. The crane return system of claim 8, and further comprising a pump to pump hydraulic fluid from the hydraulic fluid reservoir to the hydraulic fluid pressure vessel.
10. A crane comprising:
 - a bridge adapted to travel along a pair of rails, the bridge including a plurality of main wheels and a plurality of auxiliary drive wheels, the auxiliary drive wheels movable between a first position, in which the auxiliary drive wheels are recessed from the rails when power is supplied to the crane, and a second position, in which the auxiliary drive wheels are in contact with the rails when power is off to the crane;

a hydraulic fluid pressure vessel filled with hydraulic fluid;
a hydraulic cylinder interconnected with the auxiliary drive wheels and selectively fluidly connected with the hydraulic fluid pressure vessel, wherein when power is lost to the crane, hydraulic fluid is delivered from the hydraulic pressure vessel to the hydraulic cylinder to extend the hydraulic cylinder and thereby move the auxiliary drive wheels from the first position to the second position; and

a drive motor interconnected with the auxiliary drive wheels and selectively fluidly connected with the hydraulic fluid pressure vessel, wherein when the auxiliary drive wheels are in the second position, hydraulic fluid is diverted from the hydraulic cylinder and delivered from the hydraulic fluid pressure vessel to the drive motor to rotate the auxiliary drive wheels and move the bridge toward a home position.

11. The crane of claim 10 wherein as the auxiliary drive wheels contact the rails, the main wheels are lifted from contact with the rails.

12. The crane of claim 10, and further comprising a normally-closed power loss valve in fluid communication with the hydraulic fluid pressure vessel and interconnected with a power source, wherein when power is lost to the crane the power loss valve opens to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the hydraulic cylinder.

13. The crane of claim 10, and further comprising a wheel down valve in fluid communication with the hydraulic fluid pressure vessel, wherein when the auxiliary drives wheels are in the second position the wheel down valve actuates to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the drive motor.

14. The crane of claim 13, and further comprising a wheel down limit switch coupled to the wheel down valve, wherein upon contact of the wheel down limit switch with one of the rails, the wheel down limit switch actuates the wheel down valve to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the drive motor.

15. The crane of claim 10, and further comprising a normally-open home position valve in fluid communication with the drive motor, wherein when the bridge reaches the home position

the home position valve closes to stop flow of hydraulic fluid to the drive motor and thereby stop rotation of the auxiliary drive wheels.

16. The crane of claim 17, and further comprising a home position limit switch coupled to the home position valve, wherein upon contact of the home position limit switch with the home position, the home position limit switch actuates the home position valve closed.

17. The crane of claim 10, and further comprising a normally-closed reset valve in fluid communication with the hydraulic cylinder, wherein when power is restored to the crane after loss of power the reset valve opens to allow hydraulic fluid to flow to the from the hydraulic cylinder to retract the hydraulic cylinder and thereby move the auxiliary drive wheels from the second position to the first position.

18. The crane of claim 10, and further comprising a hydraulic fluid reservoir in fluid communication with the hydraulic cylinder, the drive motor and the hydraulic fluid pressure vessel, the hydraulic fluid reservoir for receiving hydraulic fluid from the hydraulic cylinder and the drive motor and for delivering hydraulic fluid to the hydraulic fluid pressure vessel.

19. The crane of claim 18, and further comprising a pump to pump hydraulic fluid from the hydraulic fluid reservoir to the hydraulic fluid pressure vessel.

20. A method for returning a crane component to a home position upon a loss of power to a crane, the crane including a bridge adapted to travel along at least one rail with a plurality of main wheels in contact with the rail and a plurality of auxiliary drive wheels recessed from the rail, the method comprising:

supplying and storing hydraulic fluid in a hydraulic fluid pressure vessel;

upon a loss of power to the crane, supplying hydraulic fluid from the hydraulic fluid pressure vessel to a hydraulic cylinder interconnected with the auxiliary drive wheels, the hydraulic cylinder extending to move the auxiliary drive wheels into contact with the rail;

supplying hydraulic fluid from the hydraulic fluid pressure vessel to a drive motor when the auxiliary drive wheels contact the rail to drive the auxiliary drive wheels such that the bridge travels along the rail toward the home position, wherein hydraulic fluid is diverted from the hydraulic cylinder; and

stopping flow of hydraulic fluid to the drive motor when the bridge reaches the home position to thereby stop the auxiliary drive wheels.

21. The method of claim 20, and further comprising removing the main wheels from contact with the rail when the auxiliary drive wheels are moved into contact with the rail.

22. The method of claim 20 wherein supplying hydraulic fluid to the hydraulic cylinder comprises opening a normally-closed power loss valve to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the hydraulic cylinder, wherein the power loss valve is in fluid communication with the hydraulic fluid pressure vessel and interconnected with a power source.

23. The method of claim 20 wherein supplying hydraulic fluid to the drive motor comprises actuating a wheel down valve to allow hydraulic fluid to flow from the hydraulic fluid pressure vessel to the drive motor, wherein the wheel down valve is in fluid communication with the hydraulic fluid pressure vessel.

24. The method of claim 20 wherein stopping flow of hydraulic fluid to the drive motor comprises closing a normally-open home position valve to stop flow of hydraulic fluid to the drive motor and thereby stop the auxiliary drive wheels, wherein the home position valve is in fluid communication with the drive motor.

25. The method of claim 20, and further comprising:
restoring power to the crane; and
retracting the auxiliary drive wheels away from contact with the rail.

26. The method of claim 25 wherein retracting the auxiliary drive wheels comprises opening a normally-closed reset valve to allow hydraulic fluid to flow to and from the hydraulic cylinder to retract the hydraulic cylinder and thereby move the auxiliary drive wheels away from contact with the rail, wherein the reset valve is in fluid communication with the hydraulic cylinder.